

CLAIMS

1. A power-supply apparatus for outputting from an output terminal via each of one or more switching 5 elements, each element having a control electrode, a voltage input to an input terminal, comprising:

a voltage-generating circuit for generating an output voltage V_o proportional to a voltage between an input end and an output end of said switching element 10 so as to output the generated voltage; and

a control circuit for controlling an operation of said switching element depending on the output voltage V_o of the voltage-generating circuit;

wherein the control circuit causes the switching 15 element to reduce an output current when the output voltage V_o of the voltage-generating circuit exceeds a predetermined reference voltage V_s .

2. A power-supply apparatus for outputting from 20 an output terminal via each of one or more switching elements, each element having a control electrode, a voltage input to an input terminal, comprising:

a voltage-generating circuit for generating an output voltage V_o proportional to a voltage between said 25 input terminal and said output terminal so as to output

the generated voltage; and

a control circuit for controlling an operation of said switching element depending on the output voltage V_o of the voltage-generating circuit;

5 wherein the control circuit causes the switching element to reduce an output current when the output voltage V_o of the voltage-generating circuit exceeds a predetermined voltage V_s .

10 3. A power-supply apparatus for controlling a voltage input to an input terminal such that the voltage reaches at or below a predetermined clamping voltage so as to output said controlled voltage from an output terminal, comprising:

15 one or more switching elements, each having a control electrode that is connected between said input terminal and the output terminal;

a voltage-generating circuit for generating an output voltage V_o proportional to a voltage between an 20 input end and an output end of each of said switching elements so as to output the generated voltage; and a control circuit for controlling an operation of said switching element depending on the output voltage V_o of the voltage-generating circuit;

25 wherein the control circuit causes the switching

element to reduce an output current when the output voltage V_o of the voltage-generating circuit exceeds a predetermined reference voltage V_s .

5 4. A power-supply apparatus for controlling a voltage input to an input terminal such that the voltage reaches at or below a predetermined clamping voltage so as to output said controlled voltage from an output terminal, comprising:

10 one or more switching elements, each having a control electrode that is connected between said input terminal and the output terminal;

15 a voltage-generating circuit for generating an output voltage V_o proportional to a voltage between said input terminal and said output terminal so as to output the generated voltage; and

20 a control circuit for controlling an operation of each of said switching elements depending on the output voltage V_o of the voltage-generating circuit; wherein the control circuit causes the switching element to reduce an output current when the output voltage V_o of the voltage-generating circuit exceeds a predetermined reference voltage V_s .

25 5. The power-supply apparatus as claimed in

claim 1,

wherein the voltage-generating circuit comprises:
a first MOS transistor having a source connected to said
input terminal and a gate connected to said output
5 terminal; and

a second MOS transistor having a source, a
drain and a gate that are respectively connected to a
drain of the first MOS transistor, a ground voltage, and
a predetermined voltage V_{bias} ;

10 and wherein said first MOS transistor and said
second MOS transistor, being of the same type of MOS
transistor output from a junction of said first MOS
transistor and second MOS transistor a voltage V_o
proportional to a voltage between said input terminal and
15 the output terminal.

6. The power-supply apparatus as claimed in
claim 5,

wherein said first MOS transistor and said
20 second MOS transistor have the same electrical
characteristics.

7. The power-supply apparatus as claimed in
claim 5,

25 wherein each of said first MOS transistor and

said second MOS transistor is a PMOS transistor.

8. The power-supply apparatus as claimed in
claim 5,

5 wherein said proportional voltage V_o is a
voltage having added to a predetermined voltage V_{bias} a
gate-source voltage of the second MOS transistor.

9. The power-supply apparatus as claimed in
10 claim 1,

wherein said control circuit comprises:

a reference-voltage generating circuit for
generating a predetermined reference voltage V_s so as to
output the generated voltage; and

15 a comparator circuit for controlling the
operation of said switching element such that said
proportional output voltage V_o reaches said reference
voltage V_s .

20 10. The power-supply apparatus as claimed in
claim 1,

wherein said switching element, said voltage-
generating circuit, and said control circuit are
integrated into one integrated circuit.